WHAT IS CLAIMED IS:

1. A system for calculating a position of a radioactivity emitting source in a system-of-coordinates, the system comprising:

(a) a radioactive emission detector;

(b) a position tracking system being connected to and/or communicating with said radioactive emission detector; and

(c) a data processor being designed and configured for receiving data inputs from said position tracking system and from said radioactive emission detector and for calculating the position of the radioactivity emitting source in the system-of-coordinates.

2. The system of claim 1, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

3. The system of claim 1, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

4. The system of claim 1, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

5. A method for defining a position of a radioactivity emitting source in a system-of-coordinates, the method comprising the steps of:

(a) providing a radioactive emission detector being connected to or communicating with a position tracking system; and

(b) monitoring radioactivity being emitted from the radioactivity emitting source, while at the same time, monitoring the position of said radioactive emission detector in the system-of-

coordinates, thereby defining the position of the radioactivity emitting source in the system-of-coordinates.

6. The method for claim 5, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

7. The method for claim 5, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

8. The method for claim 5, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic

field based position tracking system and an optical based position tracking system.

9. A system for calculating a position of a radioactivity emitting source in a first system-of-coordinates and further of projecting the position of the radioactivity emitting source onto a second system-of-coordinates, the system comprising:

(a) a radioactive emission detector;

(b) a position tracking system being connected to and/or communicating with said radioactive emission detector; and

(c) a data processor being designed and configured for:

(i) receiving data inputs from said position tracking system and from said radioactive emission detector;

(ii) calculating the position of the radioactivity emitting source in the first system-of-coordinates; and

(iii) projecting the position of the radioactivity emitting source onto the second system-of-coordinates.

10. The system of claim 9, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

11. The system of claim 9, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

12. The system of claim 9, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

13. A method for calculating a position of a radioactivity emitting source in a first system-of-coordinates and for projecting the position of the radioactivity emitting source onto a second system-of-coordinates, the method comprising the steps of:

(a) providing a radioactive emission detector being connected to or communicating with a position tracking system; and

(b) monitoring radioactivity being emitted from the radioactivity emitting source, while at the same time, monitoring the position of said radioactive emission detector in the first system-of-coordinates, thereby defining the position of the radioactivity emitting source in the first system-of-coordinates and projecting the position of the radioactivity emitting source onto the second system-of-coordinates.

14. The method for claim 13, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled

inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

15. The method for claim 13, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

16. The method for claim 13, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

17. A system for calculating a position of a body component and a position of a radiopharmaceutical uptaking portion of the body component within a subject, the system comprising:

(a) a three-dimensional imaging modality being connected to and/or communicating with a first position tracking system for calculating the position of the body component in a first system-of-coordinates;

(b) a radioactive emission detector being connected to and/or communicating with a second position tracking system for tracking a position of the radiopharmaceutical uptaking portion of the body component in a second system-of-coordinates; and

(c) at least one data processor being designed and configured for receiving data inputs from said three-dimensional imaging modality, said first position tracking system, said radioactive emission detector and said second position tracking system and calculating the position of the body component and the position of the radiopharmaceutical uptaking portion of the body component in a common system-of-coordinates.

18. The system of claim 17, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the

position of the radiopharmaceutical uptaking portion of the body component in said second system-of-coordinates is projected onto said first system-of-coordinates.

19. The system of claim 17, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the body component in said first system-of-coordinates is projected onto said second system-of-coordinates.

20. The system of claim 17, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

21. The system of claim 17, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the body component in said first system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component

in said second system-of-coordinates are both projected onto said common system-of-coordinates.

22. The system of claim 17, wherein said first position tracking system and said second position tracking system are a single position tracking system.

23. The system of claim 17, wherein said imaging modality communicates with an image presentation device which serves for visual co-presentation of said body component and said radiopharmaceutical uptaking portion of the body component.

24. The system of claim 17, wherein said radioactive emission detector is selected from the group consisting of narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

25. The system of claim 17, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers

based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

26. The system of claim 17, wherein said imaging modality is selected from the group consisting of a Fluoroscope, a Computed Tomographer, an Magnetic Resonance Imager, an ultrasound imager and an optical camera.

27. The system of claim 17, wherein said radiopharmaceutical is selected from the group consisting of ^{131}I, ^{67}Ga, ^{99M}Tc methoxyisobutyl isonitrile, $^{201}TlCl$, ^{18}F-fluorodeoxyglucose, ^{125}I-fibrinogen and ^{111}In-octreotide.

28. A method for calculating a position of a body component and a position of a radiopharmaceutical uptaking portion of the body component within a subject, the method comprising the steps of:

(a) providing a three-dimensional imaging modality being connected to and/or communicating with a first position tracking system and calculating the position of the body component in a first system-of-coordinates;

(b) providing a radioactive emission detector being connected to and/or communicating with a second position tracking system and tracking a position of the radiopharmaceutical uptaking portion of the body component in a second system-of-coordinates; and

(c) receiving data inputs from said three-dimensional imaging modality, said first position tracking system, said radioactive emission detector and said second position tracking system and calculating the position of the body component and the position of the radiopharmaceutical uptaking portion of the body component in a common system-of-coordinates.

29. The method for claim 28, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component

in said second system-of-coordinates is projected onto said first system-of-coordinates.

30. The method for claim 28, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the body component in said first system-of-coordinates is projected onto said second system-of-coordinates.

31. The method for claim 28, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

32. The method for claim 28, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the body component in said first system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component in said second system-of-coordinates are both projected onto said common system-of-coordinates.

33. The method for claim 28, wherein said first position tracking system and said second position tracking system are a single position tracking system.

34. The method for claim 28, wherein said imaging modality communicates with an image presentation device which serves for visual co-presentation of said body component and said radiopharmaceutical uptaking portion of the body component.

35. The method for claim 28, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

36. The method for claim 28, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an

electromagnetic field based position tracking system and an optical based position tracking system.

37. The method for claim 28, wherein said imaging modality is selected from the group consisting of a fluoroscope, a computerized tomography scanner, a magnetic resonance imager and an ultrasound imager and an optical camera.

38. The method for claim 28, wherein said radiopharmaceutical is selected from the group consisting of ^{131}I, ^{67}Ga, ^{99M}Tc methoxyisobutyl isonitrile, $^{201}TlCl$, ^{18}F-fluorodeoxyglucose, ^{125}I-fibrinogen and ^{111}In-octreotide.

39. A system for performing an intrabody surgical procedure on a radiopharmaceutical uptaking portion of a body component within a subject, the system comprising:

(a) a radioactive emission detector being connected to and/or communicating with a first position tracking system for tracking a position of the radiopharmaceutical uptaking

portion of the body component in a first system-of-coordinates;

(b) a surgical instrument being connected to and/or communicating with a second position tracking system for tracking a position of said surgical instrument in a second system-of-coordinates; and

(c) at least one data processor being designed and configured for receiving data inputs from said first position tracking system, said radioactive emission detector and said second position tracking system and for calculating the position of the surgical instrument and the radiopharmaceutical uptaking portion of the body component in a common system-of-coordinates.

40. The system of claim 39, wherein said surgical instrument includes an additional radioactive emission detector, whereas said at least one data processor being further designed and configured for receiving data inputs from said additional radioactive emission detector for refining the position of the radiopharmaceutical uptaking portion of the body component in the common system-of-coordinates.

41. The system of claim 39, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates is projected onto said second system-of-coordinates.

42. The system of claim 39, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates is projected onto said first system-of-coordinates.

43. The system of claim 39, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

44. The system of claim 39, wherein said second system-of-coordinates, said first system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and

the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates are both projected onto said common system-of-coordinates.

45. The system of claim 39, wherein said first position tracking system and said second position tracking system are a single position tracking system.

46. The system of claim 39, further comprising an image presentation device which serves for visual co-presentation of the position of said surgical instrument and the radiopharmaceutical uptaking portion of the body component.

47. The system of claim 39, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

. The system of claim 39, wherein said position tracking system is selected from the group consisting of an articulated arm position

tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

49. The system of claim 39, wherein said surgical instrument is selected from the group consisting of laser probe, cardiac catheter, angioplastic catheter, endoscopic probe, biopsy needle, ultrasonic probe, fiber optic scopes, aspiration tubes, laparoscopy probe, thermal probe and suction/irrigation probe. Please add a pointing device for the open surgery application.

50. The system of claim 39, wherein said radiopharmaceutical is selected from the group consisting of ^{131}I, ^{67}Ga, ^{99M}Tc methoxyisobutyl isonitrile, $^{201}TlCl$, ^{18}F-fluorodeoxyglucose, ^{125}I-fibrinogen and ^{111}In-octreotide.

51. The system of claim 39, further comprising a three-dimensional imaging modality being connected to and/or communicating with a third position tracking system for calculating the position of a body component in a third system-of-coordinates.

52. The system of claim 51, wherein said data processor being further designed and configured for receiving data inputs from said three-dimensional imaging modality and said third position tracking system and for calculating the position of said surgical instrument and the position of the radiopharmaceutical uptaking portion of a body component and the position of said body component in a common system-of-coordinates.

53. The system of claim 52, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates and said position of said body component in said third system-of-coordinates are projected onto said second system-of-coordinates.

54. The system of claim 52, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore position of the surgical instrument in said second system-of-coordinates and said position of said body component in said third system-of-coordinates are projected onto said first system-of-coordinates.

55. The system of claim 52, wherein said third system-of-coordinates serves as said common system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates are projected onto said third system-of-coordinates.

56. The system of claim 52, wherein said first system-of-coordinates, said second system-of-coordinates, said third system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

57. The system of claim 52, wherein said second system-of-coordinates, said first system-of-coordinates, said third system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates and the position of said body component in said third system-of-coordinates are all projected onto said common system-of-coordinates.

58. The system of claim 51, wherein said first position tracking system, said second position tracking system and said third position tracking system are a single position tracking system.

59. The system of claim 51, further comprising an image presentation device which serves for visual co-presentation of the position of said surgical instrument and the radiopharmaceutical uptaking portion of the body component and said body component.

60. The system of claim 51, wherein said imaging modality is selected from the group consisting of a fluoroscope, a computerized tomography scanner, a magnetic resonance imager and an ultrasound imager and an optical camera.

61. The system of claim 51, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

62. A method for performing an intrabody surgical procedure on a radiopharmaceutical uptaking portion of a body component within a subject, the method comprising the steps of:

(a) providing a radioactive emission detector being connected to and/or communicating with a first position tracking system and tracking a position of the radiopharmaceutical uptaking

portion of the body component in a first system-of-coordinates;

(b) providing a surgical instrument being connected to and/or communicating with a second position tracking system and tracking a position of said surgical instrument in a second system-of-coordinates while performing the intrabody surgical procedure; and

(c) receiving data inputs from said first position tracking system, said radioactive emission detector and said second position tracking system and calculating the position of the surgical instrument and the radiopharmaceutical uptaking portion of the body component in a common system-of-coordinates while performing the intrabody surgical procedure.

63. The system of claim 62, wherein said surgical instrument includes an additional radioactive emission detector, whereas said at least one data processor being further designed and configured for receiving data inputs from said additional radioactive emission detector for refining the

position of the radiopharmaceutical uptaking portion of the body component in the common system-of-coordinates.

64. The method for claim 62, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates is projected onto said second system-of-coordinates.

65. The method for claim 62, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates is projected onto said first system-of-coordinates.

66. The method for claim 62, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

67. The method for claim 62, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates are both projected onto said common system-of-coordinates.

68. The method for claim 62, wherein said first position tracking system and said second position tracking system are a single position tracking system.

69. The method for claim 62, further comprising an image presentation device which serves for visual co-presentation of the position of said surgical instrument and the radiopharmaceutical uptaking portion of the body component.

70. The method for claim 62, wherein said radioactive emission detector is selected from the group consisting of a narrow beam radioactive emission detector and a spatially sensitive radioactivity detector.

71. The method for claim 62, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system

72. The method for claim 62, wherein said surgical instrument is selected from the group consisting of laser probe, cardiac catheter, angioplastic catheter, endoscopic probe, biopsy needle, ultrasonic probe, fiber optic scopes, aspiration tubes, laparoscopy probe, thermal probe and suction/irrigation probe.

73. The method for claim 62, wherein said radiopharmaceutical is selected from the group consisting of ^{131}I, ^{67}Ga, ^{99M}Tc methoxyisobutyl isonitrile, $^{201}TlCl$, ^{18}F-fluorodeoxyglucose, ^{125}I-fibrinogen and ^{111}In-octreotide.

74. The method for claim 62, further the step of providing a three-dimensional imaging modality being connected to and/or communicating with a third position tracking system and calculating the position of a body component in a third system-of-coordinates.

75. The method for claim 74, further comprising the step of receiving data inputs from said three-dimensional imaging modality and said third position tracking system and for calculating the position of said surgical instrument and the position of the radiopharmaceutical uptaking portion of a body component and the position of said body component in a common system-of-coordinates.

76. The method for claim 74, wherein said first position tracking system, said second position tracking system and said third position tracking system are a single position tracking system.

77. The method for claim 74, further comprising the step of co-presenting the position of said surgical instrument and the radiopharmaceutical uptaking portion of the body component and said body component via a visual presentation device.

78. The method for claim 74, wherein said imaging modality is selected from the group consisting of a fluoroscope, a computerized tomography scanner, a magnetic resonance imager and an ultrasound imager and an optical camera.

79. The method for claim 74, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an

electromagnetic field based position tracking system and an optical based position tracking system

80. The method for claim 75, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates and said position of said body component in said third system-of-coordinates are projected onto said second system-of-coordinates.

81. The method for claim 75, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and said position of said body component in said third system-of-coordinates are projected onto said first system-of-coordinates.

82. The method for claim 75, wherein said third system-of-coordinates serves as said common system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and

the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates are projected onto said third system-of-coordinates.

83. The method for claim 75, wherein said first system-of-coordinates, said second system-of-coordinates, said third system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

84. The method for claim 75, wherein said first system-of-coordinates, said second system-of-coordinates, said third system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the surgical instrument in said second system-of-coordinates and the position of the radiopharmaceutical uptaking portion of the body component in said first system-of-coordinates and the position of said body component in said third system-of-coordinates are all projected onto said common system-of-coordinates.

85. A system for generating a two or three dimensional image of a radioactivity emitting source in a body, the system comprising:

(a) a radioactive emission detector;

(b) a position tracking system being connected to and/or communicating with said radioactive emission detector; and

(c) a data processor being designed and configured for receiving data inputs from said position tracking system and from said radioactive emission detector and for generating the two or three dimensional image of the radioactivity emitting source.

86. A method of generating a two or three dimensional image of a radioactivity emitting source in a body, the system comprising:

(a) scanning the body with a radioactive emission detector;

(b) using a position tracking system being connected to and/or communicating with said radioactive emission detector for determining a position in a three dimensional system of coordinates of said radioactive emission detector; and

(c) data processing inputs from said position tracking system and from said radioactive emission detector for generating the two

or three dimensional image of the radioactivity emitting source.

87. A system for calculating a position of a radioactivity emitting source in a system-of-coordinates, the system comprising:

(a) at least two radioactive emission detectors;

(b) a position tracking system being connected to and/or communicating with said at least radioactive emission detectors; and

(c) a data processor being designed and configured for receiving data inputs from said position tracking system and from said at least two radioactive emission detectors and for calculating the position of the radioactivity emitting source in the system-of-coordinates.

88. The system of claim 87, wherein said at least two radioactive emission detectors are physically connected therebetween via a flexible connector.

89. A method for defining a position of a radioactivity emitting source in a system-of-coordinates, the method comprising the steps of:

(a) providing at least one radioactive emission detector being connected to or communicating with a position tracking system; and

(b) monitoring radioactivity being emitted from the radioactivity emitting source, while at the same time, monitoring the position of said at least one radioactive emission detector in the system-of-coordinates, thereby defining the position of the radioactivity emitting source in the system-of-coordinates.

90. The method of claim 89, wherein at least two radioactive emission detectors are provided.

91. The method of claim 90, wherein said at least two radioactive emission detectors are physically connected therebetween via a flexible connector.

92. A system for calculating a position of a radioactivity emitting source in a first system-of-coordinates and further of projecting the position of the radioactivity emitting source onto a second system-of-coordinates, the system comprising:

(a) at least two radioactive emission detectors;

(b) a position tracking system being connected to and/or communicating with said at least two radioactive emission detectors; and

(c) a data processor being designed and configured for:

(i) receiving data inputs from said position tracking system and from said at least two radioactive emission detectors;

(ii) calculating the position of the radioactivity emitting source in the first system-of-coordinates; and

(iii) projecting the position of the radioactivity emitting source onto the second system-of-coordinates.

93. The system of claim 92, wherein said at least two radioactive emission detectors are physically connected therebetween via a flexible connector.

94. A method for calculating a position of a radioactivity emitting source in a first system-of-coordinates and for projecting the position of the radioactivity emitting source onto a second system-of-coordinates, the method comprising the steps of:

(a) providing at least one radioactive emission detector being connected to or communicating with a position tracking system; and

(b) monitoring radioactivity being emitted from the radioactivity emitting source, while at the same time, monitoring the position of said at least one radioactive emission detector in the first system-of-coordinates, thereby defining the position of the radioactivity emitting source in the first system-of-coordinates and projecting the position of the radioactivity emitting source onto the second system-of-coordinates.

95. A system for performing an intrabody surgical procedure on a radiopharmaceutical uptaking portion of a body component within a subject, the system comprising a surgical instrument being connected to and/or communicating with a position tracking system for tracking a position of said surgical instrument in a system-of-coordinates, said surgical instrument including a radioactive emission detector coupled thereto for monitoring said radiopharmaceutical in situ.

96. The system of claim 95, wherein said radioactive emission detector is sensitive to beta radiation and/or positron radiation.

97. The system of claim 95, wherein said surgical instrument includes a tissue resecting mechanism.

98. The system of claim 95, wherein said surgical instrument includes a tissue sampling mechanism.

99. The system of claim 95, wherein said tissue sampling mechanism includes an aspiration mechanism.

100. A system for calculating a position of a radioactivity emitting source in a system-of-coordinates, the system comprising:

(a) a surgical instrument designed and constructed for invasing a body of a subject, said surgical instrument including a radioactive emission detector connected thereto or integrated therein;

(b) a position tracking system being connected to and/or communicating with said surgical instrument; and

(c) a data processor being designed and configured for receiving data inputs from said position tracking system and from said radioactive emission detector and for calculating the position of the radioactivity emitting source in the system-of-coordinates.

101. The system of claim 100, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled

inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

102. The system of claim 100, wherein said radioactive emission detector is a narrow beam radioactive emission detector.

103. The system of claim 100, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

104. A system for calculating a position of a radioactivity emitting source in a first system-of-coordinates and further of projecting the position of the radioactivity emitting source onto a second system-of-coordinates, the system comprising:

(a) a surgical instrument designed and constructed for invasing a body of a subject, said surgical instrument including a radioactive emission detector connected thereto or integrated therein;

(b) a position tracking system being connected to and/or communicating with said surgical instrument; and

(c) a data processor being designed and configured for:

(i) receiving data inputs from said position tracking system and from said radioactive emission detector;

(ii) calculating the position of the radioactivity emitting source in the first system-of-coordinates;

(iii) calculating the position of said surgical instrument in the first system-of-coordinates; and

(iii) projecting the position of the radioactivity emitting source and of the surgical instrument onto the second system-of-coordinates.

105. The system of claim 104, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically

labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

106. The system of claim 104, wherein said radioactive emission detector is a narrow beam radioactive emission detector.

107. The system of claim 104, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

108. A method for calculating a position of a radioactivity emitting source in a first system-of-coordinates and for projecting the position of the

radioactivity emitting source onto a second system-of-coordinates, the method comprising the steps of:

(a) providing a surgical instrument designed and constructed for invasing a body of a subject, said surgical instrument including a radioactive emission detector connected thereto or integrated therein, said surgical instrument being connected to or communicating with a position tracking system; and

(b) monitoring radioactivity being emitted from the radioactivity emitting source, while at the same time, monitoring the position of said radioactive emission detector in the first system-of-coordinates, thereby defining the positions of the radioactivity emitting source and of the surgical instrument in the first system-of-coordinates and projecting the position of the radioactivity emitting source onto the second system-of-coordinates.

109. The method for claim 108, wherein the radioactivity emitting source is selected from the group consisting of a radiopharmaceutically labeled benign tumor, a radiopharmaceutically labeled malignant tumor, a

radiopharmaceutically labeled vascular clot, radiopharmaceutically labeled inflammation related components, a radiopharmaceutically labeled abscess and a radiopharmaceutically labeled vascular abnormality.

110. The method for claim 108, wherein said radioactive emission detector is a narrow beam radioactive emission detector.

111. The method for claim 108, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

112. A system for calculating a position of a body component and a position of a radiopharmaceutical uptaking portion of the body component within a subject, the system comprising:

(a) a three-dimensional imaging modality being connected to and/or communicating with a first position tracking system for calculating the position of the body component in a first system-of-coordinates;

(b) a surgical instrument designed and constructed for invasing the body, said surgical instrument including a radioactive emission detector connected thereto or integrated therein, said surgical instrument being connected to and/or communicating with a second position tracking system for tracking a position of the radiopharmaceutical uptaking portion of the body component in a second system-of-coordinates; and

(c) at least one data processor being designed and configured for receiving data inputs from said three-dimensional imaging modality, said first position tracking system, said radioactive emission detector and said second position tracking system and calculating the position of the body component, the position of the radiopharmaceutical uptaking portion of the body component and the position of the surgical instrument in a common system-of-coordinates.

113. The system of claim 112, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the position of the radiopharmaceutical uptaking portion of the body component in said second system-of-coordinates is projected onto said first system-of-coordinates.

114. The system of claim 112, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the body component and surgical device in said first system-of-coordinates is projected onto said second system-of-coordinates.

115. The system of claim 112, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

116. The system of claim 112, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the body component in said first system-of-coordinates and the

positions of the radiopharmaceutical uptaking portion of the body component and of said surgical instrument in said second system-of-coordinates are projected onto said common system-of-coordinates.

117. The system of claim 112, wherein said first position tracking system and said second position tracking system are a single position tracking system.

118. The system of claim 112, wherein said imaging modality communicates with an image presentation device which serves for visual co-presentation of said body component and said radiopharmaceutical uptaking portion of the body component.

119. The system of claim 112, wherein said radioactive emission detector is a narrow beam radioactive emission detector.

120. The system of claim 112, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a

potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

121. The system of claim 112, wherein said imaging modality is selected from the group consisting of a Fluoroscope, a Computed Tomographer, an Magnetic Resonance Imager, an ultrasound imager and an optical camera.

122. The system of claim 112, wherein said radiopharmaceutical is selected from the group consisting of 2-[^{18}F]fluoro-2-deoxy-D-glucose, ^{111}In-Pentetreotide, L-3-[^{123}I]-Iodo-alpha-methyl-tyrosine, O-(2-[^{18}F]fluoroethyl)-L-tyrosine, ^{111}In-Capromab Pendetide and ^{111}In-Satumomab Pendetide.

123. A method for calculating a position of a body component and a position of a radiopharmaceutical uptaking portion of the body component within a subject, the method comprising the steps of:

(a) providing a three-dimensional imaging modality being connected to and/or communicating with a first position tracking system and calculating the position of the body component in a first system-of-coordinates;

(b) providing a surgical instrument designed and constructed for invasing the body, said surgical instrument including a radioactive emission detector connected thereto or integrated therein, said surgical instrument being connected to and/or communicating with a second position tracking system for tracking a position of the radiopharmaceutical uptaking portion of the body component in a second system-of-coordinates; and

(c) receiving data inputs from said three-dimensional imaging modality, said first position tracking system, said radioactive emission detector and said second position tracking system and calculating the position of the body component, the position of the surgical instrument and the position of the radiopharmaceutical uptaking portion of the body component in a common system-of-coordinates.

124. The method for claim 123, wherein said first system-of-coordinates serves as said common system-of-coordinates and therefore the positions of the radiopharmaceutical uptaking portion of the body component and of the surgical instrument in said second system-of-coordinates is projected onto said first system-of-coordinates.

125. The method for claim 123, wherein said second system-of-coordinates serves as said common system-of-coordinates and therefore the position of the body component in said first system-of-coordinates is projected onto said second system-of-coordinates.

126. The method for claim 123, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are a single system-of-coordinates.

127. The method for claim 113, wherein said first system-of-coordinates, said second system-of-coordinates and said common system-of-coordinates are each a separate system-of-coordinates and therefore the position of the body component in said first system-of-coordinates and the

position of the radiopharmaceutical uptaking portion of the body component and of said surgical instrument in said second system-of-coordinates are both projected onto said common system-of-coordinates.

128. The method for claim 113, wherein said first position tracking system and said second position tracking system are a single position tracking system.

129. The method for claim 113, wherein said imaging modality communicates with an image presentation device which serves for visual co-presentation of said body component, said radiopharmaceutical uptaking portion of the body component and said surgical instrument.

130. The method for claim 113, wherein said radioactive emission detector is a narrow beam radioactive emission detector.

131. The method for claim 113, wherein said position tracking system is selected from the group consisting of an articulated arm position tracking system, an accelerometers based position tracking system, a

potentiometers based position tracking system, a sound wave based position tracking system, a radiofrequency based position tracking system, an electromagnetic field based position tracking system and an optical based position tracking system.

132. The method for claim 113, wherein said imaging modality is selected from the group consisting of a fluoroscope, a computerized tomography scanner, a magnetic resonance imager and an ultrasound imager and an optical camera.

133. The method for claim 113, wherein said radiopharmaceutical is selected from the group consisting of 2-[^{18}F]fluoro-2-deoxy-D-glucose, ^{111}In-Pentetreotide, L-3-[^{123}I]-Iodo-alpha-methyl-tyrosine, O-(2-[^{18}F]fluoroethyl)-L-tyrosine, ^{111}In-Capromab Pendetide and ^{111}In-Satumomab Pendetide.